Dataset (Content) Creation Guidelines

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New datasets are always welcome for SOS Explorer! Here are a few simple guidelines to assist in the creation of content. The SOSx team has significant experience with technical and aesthetic issues when creating content for spherical display systems, and is happy to provide feedback and suggestions during production to ensure quality content. Simply email us to start the conversation: **sos.explorer@noaa.gov**

>   **Part 1** covers useful information for creating content
>
>   **Part 2** adding a new dataset using Tour Builder
>
>   **Part 3** outlines the flexibility of creating a tour using Tour Builder

Part 1 – New Content Formats and Considerations

A. Data Format

Dataset types

There are three basic types of datasets for SOSx:
Texture - Single Image

Can be displayed on the sphere. An example of this is a global image of the Age of the Seafloor. It's a static image that can be manipulated and rotated in real time from the user interface or remote control

Time Series - Image Sequence

Animates through time. An example of this would be a loop of satellite data. For an image sequence, SOSx will display the images in sequence and play them like a movie across the entire sphere surface at a pre-determined fps (frames per second). Image sequences can be of any arbitrary length, limited mainly by disk space and can be animated at frame rates up to 60 frames per second.

Video - MPEG4's save disk space but do not show time on SOSx. This means that we cannot display the date and time for data using an MP4. We suggest using Time Series for datasets where date and time are needed. Transitions, audio, special effects, and other computer graphics techniques can be added to a sequence through the use of off the shelf software like Final Cut Pro.

Unity Asset Bundles can also be made for SOSx and loaded in the application. Contact **sos.explorer@noaa.gov** for more information. (1.4 examples: Saturn with Rings, Experience: Tornado Safety)

Map Projection

For complete globe datasets - Equatorial Cylindrical Equidistant Projection

This is a simple latitude/longitude grid with the lines evenly spaced where the image is twice as wide as it is tall. To be consistent with the SOS Data Catalog, it is recommended that the 0° line go through the middle of the map, with the +/-180° lines at the edges.

For partial globe datasets: A bounding box can be set for north, south, east, west to show only a part of the world. This works best if the data is .png format, as the blue marble base map will show up underneath.
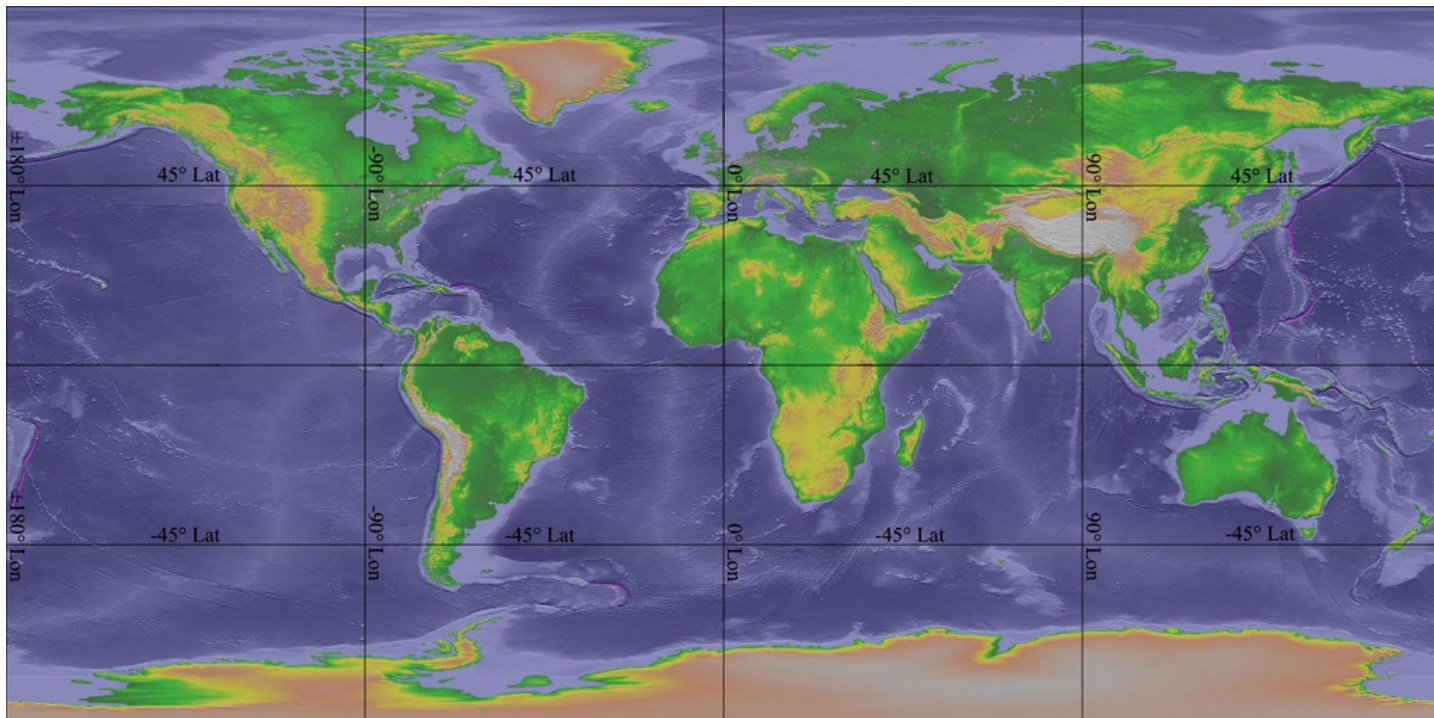
Image Format

For single images - JPEG, PNG, or DDS.

For image sequences - DDS only. The Tour Builder software application included in your installation can convert to DDS for an image directory.

Video Format - MPEG4, OGV, WMV

Render the video with the MPEG4 video codec at a minimum of 25 mbps.

Alternative Format - KML, KMZ

The software also has the ability to display KML (Keyhole Markup Language) and the compressed KMZ files on SOSx. KML is a popular specification and actively used with Google Earth for displaying data on a sphere.

Audio Format - MP3, MPEG4, WAV, OGG, AIF…

If the audio file is standalone as a narration for a tour, you can use the above formats. If it is used for a movie, it should be embedded in the same MPEG4 file as the video.

**Resolution** - 4096 x 2048 for animations, 8192 x 4096 for single images (textures).

Those are the recommended resolutions, though other 2x1 resolutions, such as 3000x1500 will work. We recommend a minimum of 2K for any dataset. Datasets with very high resolution and progressive disclosure tiles can also be added. Contact **sos.explorer@noaa.gov** for more information.

B. Image Considerations

The data should take up the whole image, with no borders or extra space around the edges. Even a pixel border will show up as a seam! In most cases, a simple 1% stretch in the horizontal will fix the problem. The data should match up at the edges of the image. If it doesn't, a seam will appear where the mismatch happens and it won't look seamless on the sphere. Examples of seams problems are shown below.

In addition to making sure that the data fills the entire frame, from 180° West to 180° East, also make sure that the data fills the entire frame from 90° South to 90° North. If there is missing data at the poles, fill in the area with a solid color or a basic land/ocean background to ensure that the dataset wraps properly around the sphere without stretching vertically.
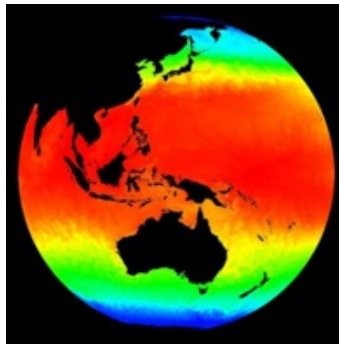
Examples of Seams – Seams are a problem that needs to be avoided.
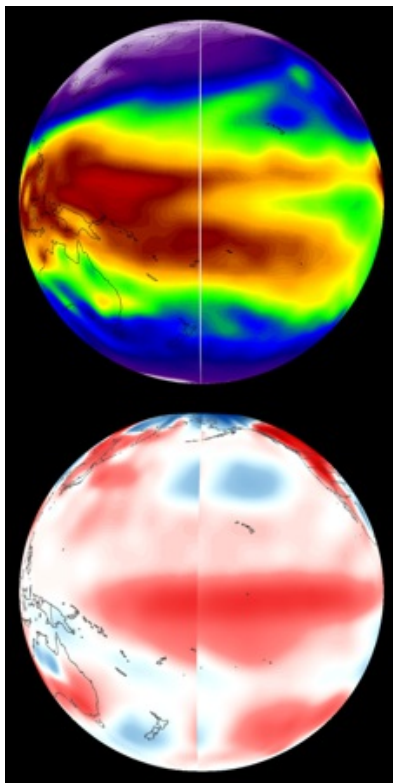
Layers – Adding flexibility to the dataset.

The layering capability in SOSx allows presenters to dynamically turn layers on and off.
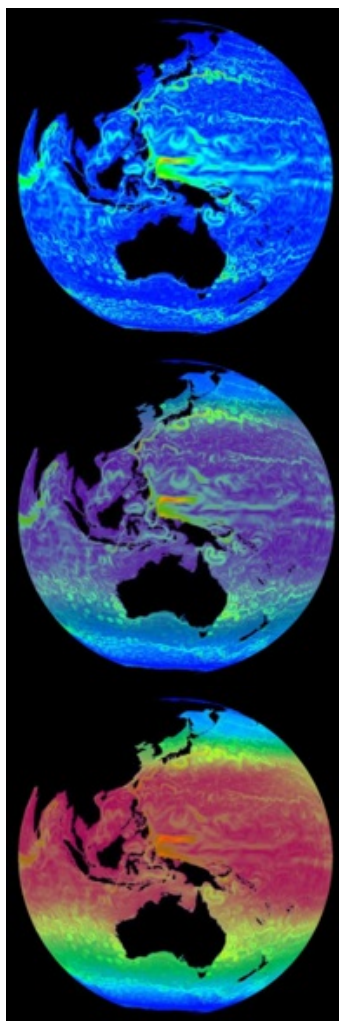
Color Suggestions

A color scale can dramatically change the emphasis and message of a dataset. Because of this, the Science On a Sphere Users Collaborative Network has had many discussions on the color scales that are used for SOSx datasets. The goal is to create datasets with well-chosen color scales that are meaningful, intuitive, and scientifically accurate. Several conclusions are the result of these discussions:

1. It can be confusing to users when the same color scheme and their associated color bars are used for two completely unrelated datasets.
2. The same color should not be used to represent more than one thing. i.e. if ice is shaded white, then white should not also be used for areas of missing data.
3. Using rainbow-colored legends and color schemes is often confusing to the audience and hard to parse. Instead, consider using shades of green to represent phytoplankton, and blue and red gradations to represent temperature anomalies. i.e. use "meaningful" colors
4. Avoid using full sphere backgrounds that are completely or pre-dominantly white. The seams between projectors become more apparent when using solid white/bright backgrounds. If using bright background colors, consider adding some noise/texture to them. Same goes for PIPs, especially those displayed at the seams between projectors.

C. Preparing Your Content

File Names - Based on Resolution, Time Stamp, and Content

- **Single images** are typically named for their resolution, such as 4096.jpg.
- **Image sequences** are kept in folders that are named for their resolution, and the images themselves should be named to sort in ascending order from earliest to latest. This can either be done with a time stamp in the file name, or a frame number in the file name with a sufficient number of leading zeros to ensure time compatibility, shown in the examples below. If your data is time-matched, the images should be named accordingly. See **Filename Mask** examples in "Establishing Time" below.

Named by date*	Named by frame count*
snow_ice_2048_20110730.png	sos_jpl_4096.0001.jpg
snow_ice_2048_20110731.png	sos_jpl_4096.0002.jpg
snow_ice_2048-20110801.png	sos_jpl_4096.0003.jpg

  *Note that these image sequence file will need to be converted to .dds format (in Tour Builder) before they will work in SOSx.

- **Videos** should be named based on content and resolution, such as hurricanes_2048.mp4. Do not use spaces and special characters in file names.

Establishing Time - Image sequences

In order for SOSx to display time and date for your image sequence dataset, you need to be able to establish a Period, Start &   End Time and a Filename Mask. These are added in the Tour Builder when adding a new dataset. This is also dependent on an indicative filename sequence.

  Period coding for SOSx can be found: https://en.wikipedia.org/wiki/ISO_8601

  For example: If you have an image for every day, you would enter: P1D

If you have an image for every 15 minutes, you would enter: PT15M

Start & End Time are entered as year, month, day and hour.

For example: If your images run for all of 2015 (and are daily) you would enter:

Start time: 2015-01-01T00:00:00 End Time: 2015-12-31T00:00:00

Filename Mask allows SOSx to understand, according to the Period and Start End Time, what is changing for each image in the sequence. The changing integers are marked with brackets [ ].

**Using the example** from above "Named by date", your Filename Mask would be:

Snow_ice_2048_[yyyyMMdd].png (When applicable, hours 0-23 are "HH", minutes 0-59 are "mm")

Using the example from above "Named frame count", your Filename Mask would be sos_jpl_4096.[####].jpg

In this "Named frame count" example, you would also enter File Sequence Start and File Sequence Increment: File Sequence Start is 1 and File Sequence Increment is 1. See below **Part 2.1 - Time Sequence** for the interface in Tour Builder where these are entered.

Colorbars and Legends – Enhancing the dataset

Colorbars and legends can (and should) be used when applicable as they provide context and units for the data. These should be standalone image files (.png or .jpg) and not burned into the global images. 500 pixels is our standard size. Never burn images   into the data itself as warping can happen when wrapping around a sphere.
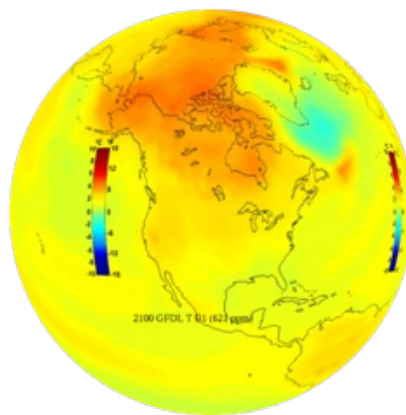
Part 2 – Using Tour Builder to Add New Datasets

Video tutorials are also available here in Manuals and Tutorials.

A. Dataset Editor Window

- Open Tour Builder
- Select Menu > Tools > Dataset Editor
- Select a directory for your new dataset (it needs to exist in "local-datasets" to show up in SOSx)
- Enter all of the information "required" in the window shown below.
- North/South/East/West can be used as a bounding box for an image that is not global.
- Data Link points to a file (image or video) or a directory of images.

Categories – Browsing dropdown in the Search Window display categories. Your system comes with Air, Experiences, Extras, Land, Movies, People, Snow and Ice, Space, Tours, Water. Add new categories as desired. Add as many categories as is appropriate for your dataset.

Dataset Editor

The dataset directory and files you create must reside under the local datasets directory

Dataset File Path:	D:\local-datasets\\dataset.json [Browse]
Website URL:	
Title:	required...
Organization:	
Abstract:	optional...
Thumbnail File:	⊗ [Browse]
Legend File:	⊗ [Browse]
North: 90 South: -90 West: -180 East: 180	
Start Time: 2016-01-01T12:00:00 End Time: 2016-01-15T12:00:00	
Data Link: File ▾	⊗ [Browse]
Format: image/dds ▾	☑ Visible In Search Window?

Categories ✓	Time Sequence	Tiles	Layers	Probing	Other

Category 1: [▾] [New]
Category 2: [▾] [New]
Category 3: [▾] [New]
Category 4: [▾] [New]
Category 5: [▾] [New]

[Save]   [Cancel]

Time Sequence – For an image sequence (directory of images), you must enter the Period, Filename Mask and for frame counts, also add File Sequence Start and File Sequence Increment. See above **Part 1 – C. Preparing your Content** for more information.

Categories ✓	Time Sequence ✓	Tiles	Layers	Probing	Other

☑ Has Time Sequenced Files?

Period: P1D
Filename Mask:
File Seq Start: 1   File Seq Inc: 1

[Save]   [Cancel]

Adding Layers – Give the layer a Title. DataLink is the name of the file, i.e. map.jpg. Choose Format. Save. You may add many layers.

Enabling Probing – If your colorbar.png is a linear, continuous gradient and your data is full color than you may want to consider filling out the probing table.

Other - If your dataset is not Earth and is a "celestial body" then checking this box disables geographic overlays specific to Earth. KML Icon Scale Factor scales the size of icons. KML Override Icon allows you to browse to a .png file that will be used for your KML placemarks.

Tools Used to Create Images from Data

- Because SOSx uses basic image formats like JPEG, and PNG as its main input format, there are many tools available for creating datasets.
- Common examples are Photoshop®, ImageMagick®, GIMP, GIS, etc.

- For creating MPEG4 files with transitions, special effects and narration, programs such as FinalCut Pro® and Adobe After Effects® are useful.
- Tools like IDL, AWIPS, McIDAS, and other image analysis applications are typically used to create imagery from scientific data sets.
- Graphics designers can use a 3D modeling applications, like 3D Studio®, to create advanced visualizations.
- GIS programs such as ArcGIS or Quantum GIS can be used to create map images. A tutorial for creating SOSx datasets with Quantum GIS is available here: http://sos.noaa.gov/Docs/qgis_tutorial.pdf .

More Information on Visualization Considerations

The following article, researching the public understanding of science content, was written by SOS Users Collaborative Network members:

Phipps, M. and Rowe, S. (2010) Seeing satellite data Public Understanding of Science. doi:10.1177/0963662508098684

Part 3 – Using Tour Builder to Create Tours (Introduction to SOSx Tours)

Find video tutorials, Tour Task Reference Guide, Introduction to SOSx Tours, and Introduction to Tour Builder in Manuals and Tutorials.

Description:

SOSx datasets can often be complex. We invented "Tours" in order to tell a story with datasets and to help our users make tangible, understandable connections between the animations and their lives or to simply play a list of datasets in a specified order while your exhibit is idle (Kiosk Timeout Tour).
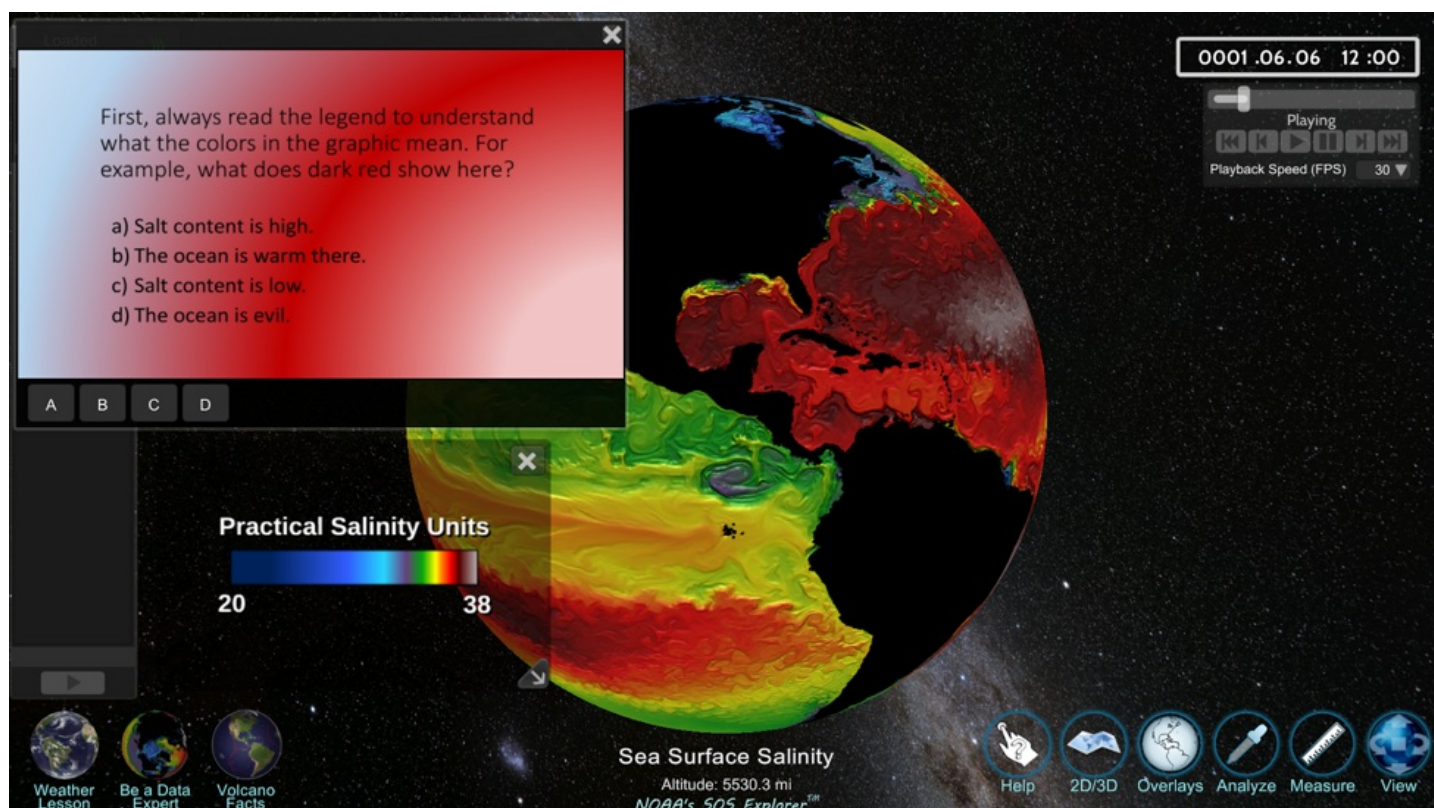
Tours can be scripted presentations that walk a user through the datasets using a storyline and a learning goal. These often include text, guiding questions, pop-up web content, videos, pictures/diagrams, and click-able place marks. For example, see "Become a Data Expert" Tour screenshot below.

Using our new Tour Builder, you can now build your own tours! Once built, your tours will show up in your search window (if desired).

Accessing Tours:

Tours can be launched three ways:

1. Hot Buttons that show up on the lower right corner of the touchscreen are linked to the tours. When clicked, Hot Buttons launch right into a tour.*
2. Tours are all named "Tour - Weather Lesson" (for example) in order for them all to show up under the letter T in the alphabetical search window.**
3. Tours are tagged as Category "Tours" (chosen in Tour Builder) in order for them to show up in the "Tours" dropdown category when browsing.***
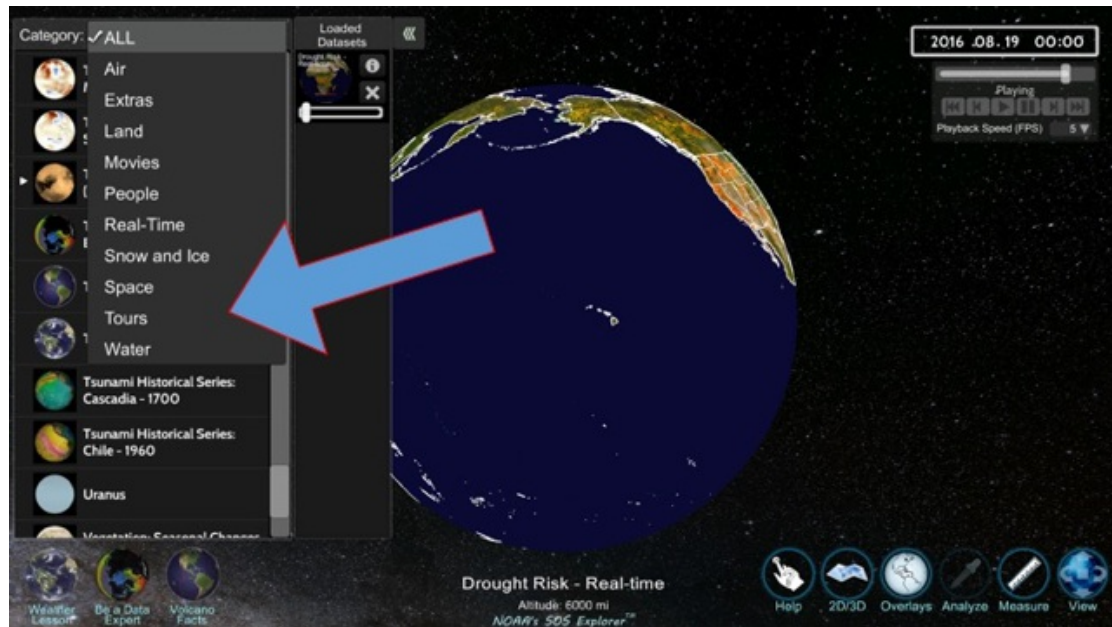
Tip: We suggest that when you make your own tours, you follow protocol #2 & #3 in order to find yours the same way.
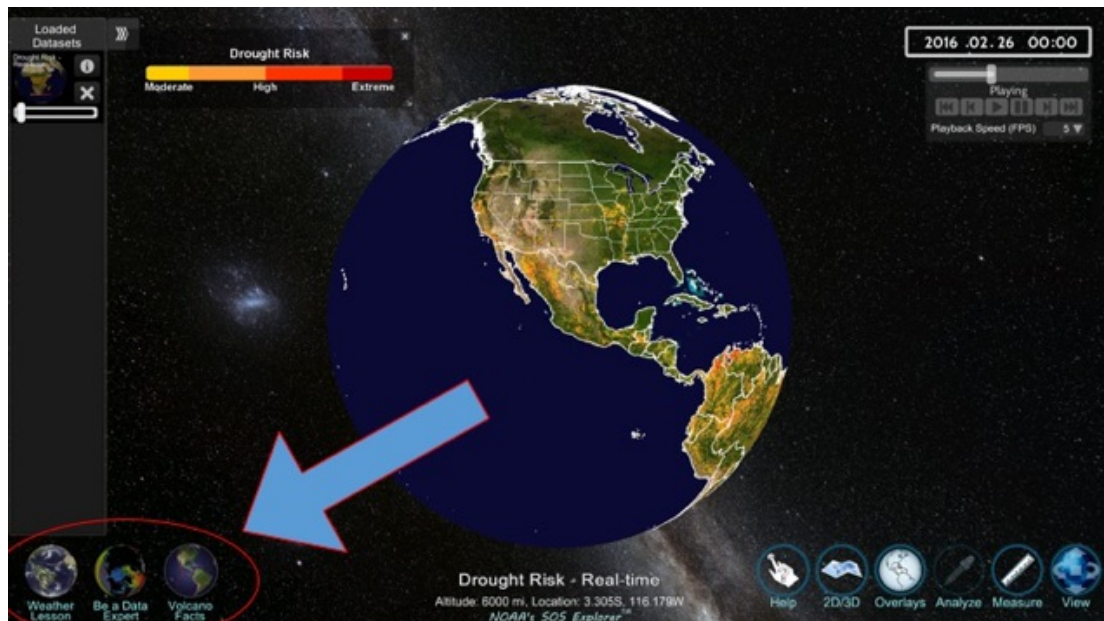
*Hot Buttons for linking tours.
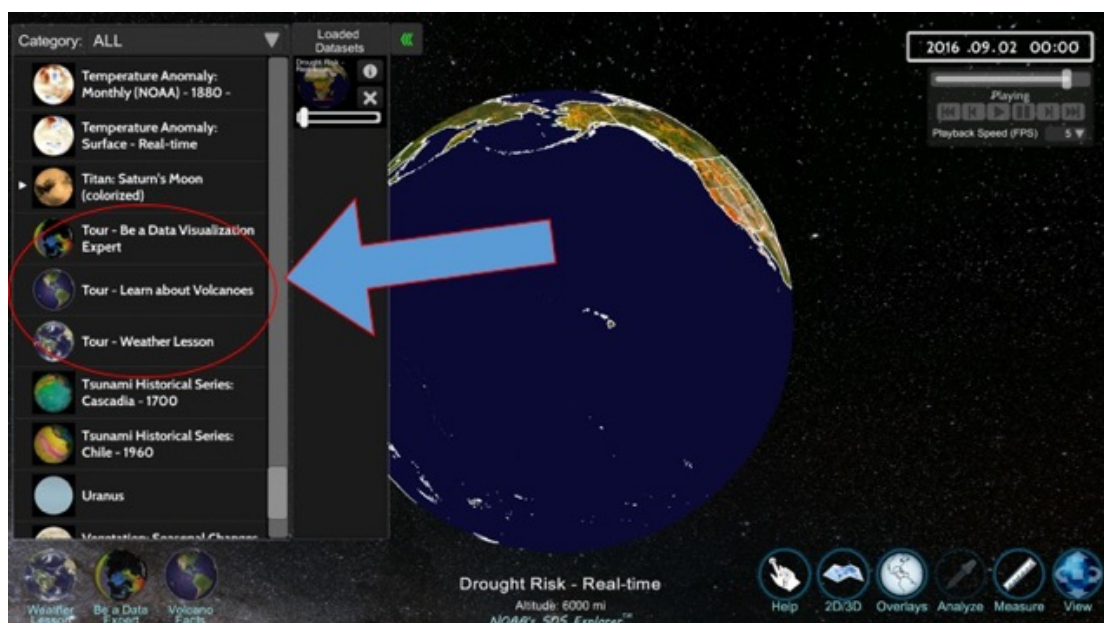
**Naming protocol "Tour - Weather Lesson" i.e.

***Category tagging as "Tour."

Tour Builder Application

Tour Builder arranges tasks in a timeline. Each Tour Task is added to the main Timeline and runs in order. For a list of the possible Tour Tasks see the Tour Builder Task Table. See how to build tours by watching our video tutorials or by reading Introduction to Tour Builder documentation.